May 1982

Extension Bulletin 696
Research Bulletin 1145
Agdex 210/608

Pesticide Use on Selected Deciduous Tree Fruit Crops

Ohio 1978

OHIO COOPERATIVE EXTENSION SERVICE
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
The Ohio State University

Pesticide Use on Selected Deciduous Tree Fruit Crops in Ohio - 1978

Prepared by

Ohio Pesticide Impact Assessment Program

Dr. Acie C. Waldron
State PIAP Liaison Coordinator

Robert L. Curtner and Bruce A. Fingerhut
Technical Assistants

Ohio Cooperative Extension Service

and

Ohio Agricultural Research and Development Center

The Ohio State University

May 1982

Introduction

The availability of reliable pest control agents is a critical factor for the production of all agricultural crops, including those classified as "minor crops" as well as the major crops. Due to the economic evaluations of pesticide development in relation to the Environmental Protection Agency (EPA) regulations and requirements for registering pesticides, industry concentrates only on products that will give them a good return on their investment dollar. This means that the emphasis toward pesticide research and registration is geared to the major crops or crops that provide a potentially large market for the pesticide product. Because of the extensive and stringent requirements for registering pesticides, both new products and those that have been registered and used in the past, research to satisfy the requirements for minor crops or minor pesticide use on major crops is not economically sound for the agricultural chemical industry. However, the need for pest control in minor crops is essential in order to preserve an intricate and significant part of our total food production. Provisions must be made to ensure the registration and availability of reliable pest control agents for that phase of agriculture. Fortunately, the program of IR-4 (Inter-regional Program for the registration of pesticides for minor crops) and more recently the attention of EPA to the problem have contributed greatly to the continued availability of pesticide products for minor crops use.

A critical factor in determining the essentiality of pesticide registrations for minor crops is accurate and factual information on the extent of use of the pesticide. Consequently, pesticide use survey information now ranks high in priority by both EPA and USDA in the pesticide impact assessment program (PIAP). Scientists involved in the PIAP in the North Central Region (and in some other regions) are convinced that pesticide use information must be significant at the state level particularly for minor crops, if not for all crops.

Although fruit is not a major crop in the overall agricultural production program for Ohio, it is important as a high value minor crop in the state and a major source of production income in some counties. In 1978, Ohio's production of strawberries, grapes, apples, and peaches ranked 6th, 7th, 10th and 27th, respectively, in the nation. Twenty-one counties in 1978[1/] and 26 counties in 1980[2/] ranked fruit and nut production from 2nd to 8th place in relative importance as the source of farm cash receipts. The total cash receipts from sales of fruit (including berries) and nuts in 1978 was $26,837,000 which accounted

---

[1]1978 Ohio Farm Income. Department Series ESS 579. Ohio Agricultural Research and Development Center. October 1979.

[2]1980 Ohio Farm Income. Department Series ESO 860, Ohio Agricultural Research and Development Center. September 1981.

for 0.9 percent of the total farm cash receipts for Ohio, in 1979 - $25,309,000 or 0.7 percent and in 1980 - $32,717,000 or 0.9 percent. Almost 78 percent of the fruit acreage in Ohio reported in the 1978 Census of Agriculture was attributed to deciduous tree fruits, over 14 percent to grapes and 6.6 percent to strawberries (See Table 1). Experience has shown that commercial tree fruit production in Ohio is impossible without the use of adequate pest control measures. Consumers have a very low acceptance for pest damage and thus extensive insect and disease control practices are a vital part of the crop production. Information on the use of pesticides is important in evaluating the impact of pesticide registrations and regulations on fruit production.

PROCEDURES

In 1978, the Economics, Statistics, and Cooperative Service (ESCS; now the Economics Research Service, ERS) of the U.S. Department of Agriculture undertook a pesticide use survey of deciduous tree fruit growers in the United States (excluding California). Commercial producing states were grouped into four regions: (1) Northeast, (2) South, (3) West, and (4) North Central. The fruits surveyed were apples, peaches, pears and tart cherries. Individual states were provided the opportunity to contribute toward expanding the data to obtain state level significance and, consequently, the Ohio Pesticide Impact Assessment Program (Ohio PIAP) became involved in obtaining the data on apples, peaches, and cherries for Ohio. Data were collected from deciduous tree fruit growers via personal interviews during November and December of 1978. The interviews provided for detailed information for 1978 production including the quantities of specific pesticides used, acres treated, number of applications, dosage rate per acre, methods and timing of applications and pest controlled.

Pesticide use data were collected for all four stages of fruit development: pre-bloom, bloom, petal fall, and post-bloom which included also a designation of use of the last post-bloom application. Names of fruit growers to be interviewed were drawn from a list of producers maintained by the Ohio Crop Reporting Service (OCRS). The orchard operations were grouped according to size (either by number of trees or by acres of orchard) to increase the sampling efficiency. The sample was drawn in such a manner to insure proportional representation of all sizes of commercial operators. Data obtained from individual operators in the survey were expanded by ESCS to reflect the state orchard operations by multiplying the sample data by the inverse of the sample ratio for each size group within a region. Pesticide use data were then adjusted by the ratio of the number of acres of each fruit reported grown in a region or state to the estimated acres from the survey data. A computer print-out of individual state data was made available to those states that supplemented the national survey.

RESULTS AND DISCUSSION

The magnitude of apple, peach, and tart cherry production in Ohio is shown in Tables 1, 2 and 3 for the period of 1974-1978. Table 1 involves

data from the 1978 Census of Agriculture and includes all farms that reported production regardless of the acreage and sales. Table 2 is taken from the Census of Agriculture for 1974 and considers only those farms that had fruit sales of $2500 or more. Table 3 is the summary of data from the Ohio Crop Reporting Service (OCRS) for production from 1974-1978. Table 4 is the summary of data from the ESCS pesticide use survey of 1978. At first glance there appears to be difference between the data reported from the three sources (ESCS, Census of Agriculture, and OCRS). Part of the explanation is provided above for the Census relative to the criteria for determining fruit growers. The figures provided by ESCS and OCRS reflect only listings of commercial fruit growers and are probably reflective of differences in the sample selection for survey purposes as well as changes in the fruit industry over a two year period. The influence of inclement weather over the past few years has resulted in the decline in fruit production acreage in some areas of the state. The severe winters in 1977 and 1978 significantly reduced commercial peach and cherry production acreages in some locations of the state as is shown in Tables 3, 4, and 5, and many orchards were destroyed. Tart cherry production dropped to such a low level that OCRS determined that after the 1978 data it would no longer be included in the statistical reports. The Lake Erie area is the major fruit production area of the state because the weather is tempered somewhat by the lake influence. However, the greater extent of winter damage and loss in peach and cherry orchards occurred in areas other than the Lake Erie area. Growers contacted in the survey were advised not to complete the questionnaire if they did not produce a crop in 1978. Consequently, that orchard and acreage was not included in the survey tabulation. Because a greater percentage of production loss occurred in areas other than the Lake Erie region, calculations on the basis of production orchards in each area could influence the farm count when extended to a state total. However, the ESCS survey is the basis from which pesticide use data were calculated for Ohio and consequently reported in this publication.

The total quantity of active ingredient (a.i.) of pesticides applied to Ohio apple, peach and tart cherry crops in 1978 was estimated to be 702,105 pounds (Table 6). Organic pesticides accounted for 277,916 pounds or 39.6 percent of the total, oil - 334,475 pounds or 47.6 percent, sulfur - 88,946 pounds or 12.6 percent and inorganic pesticides - 1,223 pounds or 0.2 percent. Approximately 88.9 percent of the total quantity of pesticides reported, or 624,451 pounds a.i., was applied to apples, which constituted about 82 percent of the fruit acreage reported (Table 4 and 6), at a rate of 51.5 pounds per acre for year. Over half of the total poundage was attributed to the application of oil of which 93 percent was applied at the pre-bloom stage. Peaches, which accounted for 16.6 percent of the fruit acreage and 10.6 percent of the total pesticide use reported, were treated with 74,618 pounds of pesticides a.i. at a rate of 30.4 pounds per acre for the year. Approximately 67 percent of that poundage was reported for sulfur with 61 percent being used post-bloom for disease control. The 221 acres of tart cherries received pesticide application at the rate of 13.7 pounds a.i. per acre during the year with approximately 34 percent of that being attributed to sulfur for disease control.

APPLES

In 1978, 212,829 pounds of fungicides a.i. were applied during the dormant and growing season to a cumulative total of 110,460 acres of apple orchards; 13,946 pounds of herbicide to 6,328 acres; 389,461 pounds of insecticides to 67,442 acres; 4,667 pounds of miticides to 8,265 acres; 229 pounds of rodenticides to 1,441 acres; and 3,319 pounds of growth regulators to 3,479 acres (Table 7). The total application was 624,451 pounds a.i. on a total cumulative acreage of 197,415 acres. The term cumulative acreage or acre treatments is the sum total of the acres treated times the number of treatments for that same acreage during the season. The data in Table 7 include the number of individual acres treated during the year and also the total acre treatments per year for each pesticide. Adequate pest control in Ohio apple orchards requires pesticide application several times during the year with a combination of pesticides.

The fungicide used in the greatest quantity was maneb which was applied to 24.6 percent of the total acreage with 61,845 pounds a.i. applied on an average of 4.4 times during the season to 2977 acres for a total of 13,130 acre treatments (Tables 7 and 9). Captan use was reported more frequently and on more acreage than any other fungicide. This treatment to 35.1 percent of the acreage amount to 39,134 pounds a.i. applied to 4,257 acres on an average of 5 times during the season for a total of 21,014 acre treatments. Following captan in order of magnitude, a total of 37,844 pounds of sulfur were applied on an average of 3.3 times to 2,660 acres (22 percent) for 8,879 acre treatments; metiram - 31,265 pounds for 5.3 times on 2,812 acres (23 percent) and 15,005 acre treatments; captafol (Difolatan) - 16,968 pounds for 1.1 times on 1,895 acres (15.6 percent) and 2,043 acre treatments; dodine - 11,724 pounds for 3.4 times on 4,325 acres (35.7 percent) and 14,830 acre treatments; dinocap - 4,762 pounds for 4.7 times on 3,493 acres (28.8 percent) and 16,443 acre treatments; and benomyl - 3,182 pounds for 3.5 times on 3,238 acres (26.7 percent) and 11,318 acre treatments. Other fungicides listed in Table 7 were applied at significantly lower poundage to significantly less acreage.

For the purpose of controlling weeds and unwanted vegetation in the orchards more oil was reported being used (7980 pounds a.i.) than any other material. However, it could not be determined from the data tabulated, which represented less than 8 percent of the survey reports, whether the oil was used as a herbicide or as a carrier for other herbicide chemicals. Oil was applied to 305 acres at the rate of 26.2 pounds per acre on an average of 1.3 times per season for 383 acre treatments. Simazine was the most extensively used herbicide with 3,157 pounds applied to 1,736 acres or 14.3 percent of the total acreage and 1,881 acre treatments. However, paraquat was used by more orchardists and on the largest acreage with 1,457 pounds applied to 2,137 acres (17.6 percent) and 2,631 acre treatments. Other herbicides were used in significantly lesser quantities. A total of 13,946 pounds of herbicides and oil were applied to 6,328 acre treatments during the season.

Oil as an insecticide was used in the greatest quantity for insect control with 319,047 pounds a.i. being applied to 7,240 acres (59.8 percent) during the year at an average of 1.33 applications per year for a total of 9,623 acre treatments. Ninety percent of the oil was applied as a dormant

spray (Table 8). Phosmet (Imidan) was the synthesized organic pesticide used by the largest percentage of orchardists on the most acreage and in the greatest quantity; 55,462 pounds a.i. were applied during an average of 5 applications per season on 7,507 acres (62 percent) for 36,764 acre treatments. Azinphosmethyl (Guthion) was next with 6,892 pounds and an average of 3.1 applications on 4,048 acres (33.4 percent) for 12,404 acre treatments. On the basis of popularity and quantity this was followed by carbaryl - 2,231 pounds with an average of 1.4 applications on 1,071 acres (8.9 percent) for 1,533 acre treatments; ethion - 1,679 pounds with an average of 1.03 applications on 2,022 acres (16.7 percent) for 2,083 acre treatments; and phosalone - 1,269 pounds with an average of 1.33 applications on 994 acres (8.2 percent) for 1,323 acre treatments. All other insecticides used were in quantities less than 1,000 pounds, 700 acres, and/or 1,000 acre treatments (Table 7).

Plictran (cyhexatin) was the most frequently used miticide applied by Ohio apple growers with reports of 2,986 pounds a.i. applied to 3,182 acres (26.3 percent of the total acreage) at an average of 1.55 times per year for a total of 4,933 acre treatments. This accounts for 64.2 percent of the total miticides reported and 59.6 percent of the acre coverage. Approximately 25.2 percent of the total miticide poundage and 28.5 percent of the acre coverage was attributed to propargite (Omite) with 1,175 pounds applied to 660 acres (5.4 percent) at 3.6 average applications per year for 2,357 acre treatments. Lesser amounts of dicofol, binapacryl, and Morestan were used (Table 7).

Zinc phosphide was the major rodenticide used with reports of 229 pounds a.i. used on 1,298 acres (10.7 percent) and 1,371 acre treatments. Seventy percent of that was used in row treatment and the remaining 30 percent for spot treatment (Table 8). Diphacinone was used on 70 acres, but the quantity used was less than 1 pound due to the low rate of application.

Daminozide (Alar) comprised ninety percent of the total quantity of growth regulators applied by orchardists. This was applied to 57 percent of the total acreage as an aid to prevent apple drop and to promote color development. Ethephon used to hasten ripening accounted for approximately 9 percent of the total quantity of growth regulators (Table 7) but only on 172 acres. Naphthaleneacetic acid, which accounted for only approximately 1 percent of the total poundage, was applied to 33 percent of the acreage treated to prevent pre-harvest apple drop.

As can be seen in Table 7, the majority of organic chemical pesticides were applied in wettable powder formulations with the major exceptions being some organophosphate insecticides, captafol, glyodin, paraquat, and some growth regulators that were only available as liquid formulations. Triazine and phenoxy herbicides use seemed to be fairly closely divided between wettable powder and liquid formulations. The pesticide formulation constituting the highest percentage of bulk use, however, was oil accounting for 77 percent of the total insecticide and 57 percent of the total herbicide use. The verfication of application rate data is difficult to ascertain without reviewing the individual survey returns. It appears, however, that the average computer calculated rates of application for most pesticide (Table 9) over the season are considerably less than the Extension Service and label recommendations. The report on stage of development of the apple crop related to specific pesticide applications appear to conform to recommendations. Also the report indicates that the application of almost all fungicides and insecticidies pro-

vided for spray coverage of each row. Spray application to each row was also predominant for herbicide, rodenticide, plant growth regulator, and miticide applications, although significant coverage was attributed to spot treatment for the first 3 above and alternate row spray coverage for the latter (Table 8).

All pesticide use in apple production reported in this survey was self applied with ground equipment, thus indicating there was no aerial application nor utilization of commercial applicators.

Table 10 provides data showing the apple orchard acreage treated and the quantity of pesticide used on the last application before harvest. The data indicate that 21.2 percent of the total quantity of organic fungicides for the year, 19 percent of the fungicide sulfur, 27 percent of the organic insecticides, and 1.3 percent of the insecticide oil were applied in the last application before harvest. The reasoning for oil insecticide application at last post-bloom is not known unless the use of spreader-sticker adjuvants were interpreted as oil. The correlation of data in Tables 8, 9 and 10 for quantity of pesticide, acres treated, stage of application, and last post-bloom treatment will provide the relationship for individual pesticides. As an example 45.6 percent of the cyhexatin, 47 percent of the propargite, and 30 percent of the captan were applied on the last post-bloom treatment although there were averages of 1.55, 3.57 and 4.94 applications, respectively, during the year. Other pesticide chemicals show closer correlation between the quantity applied at last post-bloom, the total quantity applied during the year, and the number of applications during the year. The reason for apparent lack of data correlation is not known but may be due to more acres being treated with a higher rate of application on that last treatment date before harvest or more producers using the materials for the last post-bloom application than during the rest of the season. Comparison of the acres treated last post-bloom with several pesticides versus the acres treated during the season might lead to the latter conclusion (Tables 9 and 10). The reason why some acreage data in Table 10 relative to last post-bloom application appear to be greater than that in Table 9 which are supposed to reflect seasonal totals is not known. The data were tabulated as provided by the computer print-out supplied by ESCS.

Apple scab was the most prevalent pest problem encountered by orchardists throughout the season (Table 11). At the pre-bloom stage, mites, aphids, scale, powdery mildew, moths (larvae) and other insects followed scab in order of occurrences as pest problems of significance. At the bloom stage, scab, powdery mildew, and mites were still significant problems. At petal fall the major treatments were for scab, codling moth (larvae), aphids, powdery mildew, mites, other bugs, fruit rots, and maggots. The post-bloom period was confronted with many significant pest problems including scab, codling moth (larvae), mites, aphids, powdery mildew, maggots, other bugs and fruit rots.

Table 12 shows that more apple trees were lost due to deer feeding during the winter than that caused by mice and other rodent damage, although almost twice as many producers reported loss due to mice damage. Calculations relating the total number of trees lost (9,477) with the total estimated number of trees (Table 4 and 5, indicating 1,897 trees per operation times 466 operations equals 884,002 trees) indicate about 1.1 percent tree loss due to mice, rodents, and deer during the year. Over 99 percent of that loss occurred in trees that had not yet reached bearing age. Calculations indicate that over 4.6 percent of

the stand of young non-bearing trees was lost to rodent and deer damage in 1978. Pesticide application was a common method reported for control of mice and other rodents, but the majority of respondents did not reply relative to measures to control deer damage.

A greater percentage of apple producers relied upon pest control information from the Cooperative Extension Service personnel than any other single source (Table 13). Their own experience or consultations with other producers were the next most important sources. Chemical company representatives and distributors were also a significant source of information. Although the data doesn't specify the source, many growers did not rely upon the source listed but probably used advertisements and other publications in deciding on pesticide use.

PEACHES

In 1978, 58,452 pounds of fungicides a.i., almost totally in wettable powder formulation, were applied to a cumulative total of 15,580 acres of peach orchards; 956 pounds of herbicides to 842 acres; 14,873 pounds of insecticides to 10,486 acres; 227 pounds of miticides to 548 acres; 8 pounds of rodenticides to 52 acres; and 2 pounds of plant growth regulators to 113 acres. The total application was thus 74,618 pounds of pesticides for 27,621 acre treatments. Table 14 provides the data for pesticide application including poundage, acres treated one or more times, acre treatments, and formulations used. Sulfur was used by more orchardists than any other fungicide and in the greatest quantity with 50,071 pounds on 1,571 acres (63.5 percent of the total orchard acreage) at an average of 4.5 applications per season (Table 17) for a total of 7,083 acre treatments. Captan was the organic fungicide used by the largest percentage of orchardists and in greatest quantity with 5,223 pounds on 34 percent of the acreage (834 acres) at an average of 3.4 applications per season for a total of 2,806 acre treatments. This was followed by 1,301 pounds of ferbam applied to 502 acres (20.4 percent) with an average of 1.3 applications per season for 634 acre treatments, 962 pounds of benomyl to 674 acres (27.4 percent) at 3.3 applications for a total of 2,241 acre treatments, and 767 pounds of dichlone to 1,204 acres (50 percent) at 2.2 applications for a total of 2,631 acre treatments. Other fungicide use and coverage were considerably less. Dichlone and benomyl followed in order after captan as the fungicides reported with the greatest extent of uses.

The herbicide used in largest quantity was simazine where 374 pounds a.i. were used on 151 acres. However, paraquat was used by more orchardists and had the greatest coverage with 303 pounds used on 361 acres at an average of 1.52 applications for a total of 574 acre treatments. One hundred and seventy-six pounds of herbicide oil were used but only on 7 acres with 5 applications and 33 acre treatments. Other herbicide use is listed in Table 14.

For insect control on peaches 6,574 pounds of oil were applied (most during the dormant period) on 167 acres at an average of 1.4 times per season for a total of 232 acre treatments. Phosmet was the most common synthetic organic insecticide used with 3,314 pounds a.i. applied to 46.5 percent of the acreage (1,143 acres) during an average of 3 applications per season for 3,469 acre treatments. Phosmet with carbaryl, azinphosmethyl and endosulfan constituted over 92.3 percent of all of the organic insecticides use in peach orchards

in 1978. Carbaryl was applied to 30.7 percent of the acreage with 1,575 pounds applied to 756 acres at an average of 1.5 applications per season for 1,120 acre treatments. One thousand five hundred and six pounds of azinphos-methyl were applied to 1,091 acres (44.4 percent) at an average of 3 applications for 3,300 acre treatments and 1,361 pounds of endosulfan were applied to 484 acres (19.7 percent) at an average of 2.1 applications for 1,004 acre treatments. Fifty-two percent of the total insecticides applied to peach orchards was of wettable powder formulations and 44 percent was oil.

Miticide use on peach orchards was rather limited. The largest usage consisted of 174 acre being treated with 139 pounds of dicofol (1.9 average applications per season resulting in 335 acre treatments) and 121 acres treated one time with 52 pounds of cyhexatin. The quantities of rodenticides and plant growth regulators and the acres on which used was relatively insignificant (Table 14) although the loss of fruit trees due to rodent and deer damage was about 1.2 percent of the total with one third of the loss occurring in bearing trees (Table 20).

The stage of peach development at which pesticides were applied is listed in Tables 15 and 16. It can also be observed that most pesticide application was to each row except for herbicides where 40 percent of the application was by spot treatment. Although the vast majority of pesticide application was by self with ground equipment there was some self-aerial and commercial-aerial application to a limited amount of peach orchard acreage (Tables 15 and 16).

The computer calculated rate of application per acre as indicated in Table 17 for each pesticide appears to be less than that recommended in the Ohio Cooperative Extension Service Bulletin 506 and, consequently, corresponds with the observation noted in the section on apples.

The quantities and acres treated with pesticides at the last post-bloom application prior to harvest are listed in Table 18. The acreages reported herein are in closer correlation with that reported in Tables 14 and 17 for the season than appeared to be the case with the apple data. The data show that 1,029 acres were treated with captan at last post-bloom; 1,228 acres with phosmet; 109 acres with methyl parathion; 1,278 acres with azinphos-methyl; 31 acres with propargite and 186 acres with dicofol.

The major pest problems (Table 19) for which orchardists applied pesticides to peaches were fruit rots, codling moth (larvae), other insects, mites, and scab. Aphids, beetles, powdery mildew, and fruit flies were also frequently of concern on a significant percentage of farms. Table 21 indicates that in order of preference peach orchardists relied upon information from the Cooperative Extension Service, advertising media or other sources, personal experience and other producers, and chemical company representatives and distributors in combatting pest problems.

TART CHERRIES

A total of 1,601 pounds active ingredient of fungicides; 1,293 pounds of insecticides; 105 pounds of herbicides; 1 pound of rodenticide; and 36 pounds of plant growth regulators were applied to tart cherry orchards in

Ohio in 1978 (Table 22). All of this was applied by the operators or their employees using ground equipment. Acre treatments for pesticides on cherry orchards amounted to 1,120 for fungicides, 681 for insecticides, 182 for herbicides, 11 for rodenticides, and 11 for plant growth regulators (Table 22).

Sixty-four percent of the total quantity of fungicides applied by cherry orchardists was attributed to sulfur; i.e. 1,031 pounds applied to 67 acres (30.3 percent of the total state acreage) at an average of 2.24 applications per season for 149 acre treatments. Approximately 30.9 percent of the total was attributed to three other fungicides: dodine - 256 pounds applied to 114 acres (51.6 of the total acreage) at an average of 3.4 applications per season for a total of 388 acre treatments, benomyl - 168 pounds applied to 128 acres (57.9 percent) at an average of 2.47 applications per season for 316 acre treatments, and captan - 70 pounds applied to 45 acres (20.4 percent) at 1.58 applications per season for 70 acre treatments. Fungicide application was exclusively to each row coverage (Tables 22 and 24).

Paraquat and simazine were the only herbicides reported being used in cherry orchards with paraquat accounting for 73.3 percent of the quantity applied, 80.2 percent of the acreage, and 90 percent of the acre treatments. Paraquat was applied to 73 acres and simazine to 19 acres with 80 percent of the quantity applied in spot treatment coverage.

Almost 54 percent of the insecticides used in cherry orchards was attributed to oils with 698 pounds applied to 16 acres. However, the greatest acreage coverage was with azinphosmethyl where 247 pounds a.i., constituting 19.1 percent of the total insecticide quantity, were applied to 139 acres (62.9 percent of the total acreage) on an average of 2.37 applications per season for 329 acre treatments. Mercaptodimethur was applied to 112 acres (50.7 percent) with 143 pounds (11.1 percent of total insecticides) at 1.16 applications per season for 129 acre treatments. Ninety-nine pounds of parathion were applied to 61 acres, 59 pounds of phosmet to 32 acres and 44 pounds of carbaryl to 24 acres. These three insecticides account for 7.7, 4.6, and 3.4 percent, respectively, of the total quantity applied to cherry orchards but were applied to 27.6, 14, and 10.9 percent, respectively, of the cherry acreage. Most of the insecticide applied was by each row coverage with up to 10 percent of the acreage receiving spot treatment (Table 23).

The quantity of rodenticide applied and the acreage covered was relatively insignificant (Table 22) as was also the loss of trees (all non-bearing) due to rodent and deer damage (Table 27). Eleven acres of cherries were treated with 36 pounds of Alar as an aid in preventing premature fruit drop and for coloring of the fruit.

The pesticide application for the last post-bloom period preceding harvest of cherries is listed in Table 25. The acres of cherries treated during the last post-bloom period are more in line with the acres receiving treatment during the season than was evident in similar comparisons for apples and peaches. The report showed 51 acres treated with captan at last post-bloom, 128 acres with dodine, 65 acres with parathion, 119 acres with mercaptodimethur, and 31 acres with carbaryl.

Approximately 58 percent of the cherry farms reported that fruit rot occurred in their operation before the 1978 harvest was complete (Table 26). The occurrence of other pests on cherries which was reported by over 20 percent of the growers included moths/worms, fruit flies, powdery mildew, aphids, other bugs, beetles, and slugs. The percent of potential harvest lost due to pest problems was not reported for any of the fruit crops. The information sources that cherry growers used to solve pest problems was similar in order to that of other fruits: Cooperative Extension Service, other advertising media, their own experience or that of other producers, and chemical company representatives (Table 28).

Table 1. Reported fruit acreage, pounds per acre and number of farm in Ohio, 1978

Crop	Acreage (Bearing)		lbs./acre[1]	# Farms
Apple	16,775	(11,541)	10,032	2,665
Grape	4,181	(3,930)	5,823	1,185
Peach	3,932	(1,954)	3,183	1,604
Strawberry	1,920		4,168	1,046
Pears	689	(572)	2,886	1,028
Cherries	650	(400)	967	1,027
Plums	383	(245)	2,613	907
Brambles	322		1,329	291
Blueberries	104		1,637	53
Apricot	135	(76)	9	374
Nuts	328	(151)	257	303
Total	29,419		--	10,483

[1]Bearing acres only, except berries which includes non-bearing.

Source: Census of Agriculture, County Summary Data 1978 pp. 178-185.

Table 2. Reported fruit acreage, pounds per acre, and number of farms in Ohio, 1974

Crop	Total Acreage (Bearing)		lbs./acre[1]	# Farms[2]
Apple	14,627			
Semi dwarf & dwarf	4,378	(2,846)	10,236	437
Standard	10,249	(9,225)	9,298	741
Grape	3,660	(3,346)	7,172	332
Peach	3,667	(2,787)	6,072	518
Pears	492	(385)	6,261	237
Cherries	461	(351)		172
Tart	316	(246)	3,997	96
Sweet	145	(105)	3,986	76
Plums	278	(210)	3,638	194
Nectarines	24	(16)	3,936	13
Total	23,670	(19,116)	--	2,816

[1]Bearing acres only.

[2]The 1974 Census considered all farms that had $2,500 or more of sales.

Source: Census of Agriculture, County Summary Data 1974 pp. 111-18-220.

Table 3. Fruit Production in Ohio, 1974 - 1978[1]

Crop and Year		Total Production		
		48 lb equiv.	42 lb equiv.	total pounds
		(1000)	(1000)	(mil)
Apples	1974		3095	130.0
	1975		3810	160.0
	1976		2500	105.0
	1977		1548	65.0
	1978		3333	140.0
Peaches	1974	375		18.0
	1975	458		22.0
	1976	313		15.0
	1977	63		3.0
	1978	104		5.0
Tart Cherries	1974			0.6
	1975			0.6
	1976			0.3
	1977			0.2
	1978			0.2
		(1000 tons)		
Grapes	1974	15.5		
	1975	14.6		
	1976	15.0		
	1977	7.1		
	1978	12.0		

1. Data from the Ohio Crop Reporting Service, Jan. 1, 1979

Table 4. Summary Statistics of Ohio Commercial Fruit Farms - 1978[1/]

Commodity	Number of Farms			Estimated State Acreage	
	Selected for Survey	Responding To Survey	Expanded for State Total [2/]	From 1978 Survey	1976[3/]
Apples	166	128	466	12116	11168
Peaches	118	92	270	2457	3270
Tart Cherries	34	23	46	221	245

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS

2. Information compared to Ohio Crop Reporting Service statistics of 1976 showing 535, 372, and 132 growers, respectively, on the mailing list.

3. Estimate from the Ohio Crop Reporting Service statistics.

Table 5. Characteristics of Ohio Commercial Fruit Farmers - 1978[1/]

Commodity	Average Acreage Per Farm Operation				Average Numbers of Trees Per Farm Operation	
	Owned	Rented	Total in Operation	Total of Bearing Trees	Total in Operation	Total in Bearing Age
Apples	24.26	1.88	26.1	21.3	1987	1459
Peaches	8.67	0.4	9.1	7.0	869	638
Tart Cherries	4.57	0.21	4.8	3.9	492	386

1. Data from 1978 Survey of Pesticide on Deciduous Fruits - ESCS.

Table 6. Quantities of Pesticides Used in Deciduous Tree Fruit Crops in Ohio - 1978[1]

Commodity	Insecticides			Fungicides			Herbicides		
	(Pounds active ingredient applied)								
	Organic	Inorganic	Oil	Organic	Inorganic	Sulfur	Organic	Inorganic	Oil
Apples	70357	57	319047	174985	457	37844	5526	440	7980
Peaches	8398	--	6574	8381	---	50071	779	---	176
Tart Cherries	595	--	698	539	31	1031	105	---	---
Total	79350	57	326319	183905	488	88946	6410	440	8156

	Miticides	Rodenticides	Plant Growth Regulators
Apples	4667	229	3319
Peaches	227	8	2
Tart Cherries	---	1	36
Total	4894	238	3357

Summarization of Totals	Insecticides	Fungicides	Herbicides	Miticides	Rodenticides	Plant Growth Regulators	Total
	(Pounds active ingredient applied)						
Apples	389461	212829	13946	4667	229	3319	624451
Peaches	14973	58452	956	227	8	2	74618
Tart Cherries	1293	1601	105	---	1	36	3036
Total	405727	272882	15007	4894	238	3357	702105

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

Table 7. Quantities of Pesticides Applied to Apple Orchard Acreage in Ohio and Formulations Used - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Acres Treated	Acre Treatments[3/]	Quantity Applied (lbs a.i.)	Formulations Used Percent of Acre Treatments[3/]						Formulations Used Percent of Quantity Applied					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
A. Fungicides															
Total Inorganic	--	95	457	10	0	90	0	0	0	0	0	100	0	0	0
Copper Sulfate[4/]	95	95	457	10	0	90	0	0	0	0	0	100	0	0	0
Total Dithiocarbamates	--	30317	96739	100	0	0	0	0	0	100	0	0	0	0	0
Maneb (Dithane, Manzate)	2977	13130	61845	100	0	0	0	0	0	100	0	0	0	0	0
Zinc Ion Maneb (Manzate)[4/]	153	848	1516	100	0	0	0	0	0	100	0	0	0	0	0
Zineb	582	1333	2114	100	0	0	0	0	0	100	0	0	0	0	0
Metiram (Polyram)	2812	15005	31265	100	0	0	0	0	0	100	0	0	0	0	0
Total Phthalimides	--	23375	56845	91	3	0	6	0	0	70	8	0	22	0	0
Captan	4257	21014	39134	100	0	0	0	0	0	100	0	0	0	0	0
Folpet (Phaltan)[4/]	129	318	743	100	0	0	0	0	0	100	0	0	0	0	0
Captafol (Difolatan)	1895	2043	16968	0	34	0	66	0	0	0	26	0	74	0	0
Total Karathane, Dodine & Quinones	--	33685	16895	98	0	0	1	1	0	99	0	0	1	0	0
Dichlone (Phygon)	633	2413	429	93	0	0	0	7	0	95	0	0	0	5	0
Dinocap (Karathane)	3493	16443	4742	98	0	0	2	0	0	97	0	0	3	0	0
Dodine (Cyprex)	4325	14830	11742	100	0	0	0	0	0	100	0	0	0	0	0
Glyodin[4/]	242	362	306	0	0	0	100	0	0	0	0	0	100	0	0
Streptomycin	934	2428	561	39	0	0	51	9	0	29	0	0	16	55	0
Benomyl (Benlate)	3248	11318	3182	100	0	0	0	0	0	100	0	0	0	0	0
Total Organic Chemicals	--	101486	174528	96	1	0	3	0	0	90	2	0	8	0	0
Sulfur	2660	8879	37844	96	0	0	0	4	0	89	0	0	0	11	0
Total Fungicides	--	110460	212829	96	1	0	3	1	0	89	2	0	6	2	0

Table 7. Page 2

Pesticide Active Ingredient[2] (a.i.)	Acres Treated	Acre Treatments[3]	Quantity Applied (lbs a.i.)	Formulations Used Percent of Acre Treatments[3]						Formulations Used Percent of Quantity Applied					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
B. Herbicides															
Total Inorganic	--	115	440	100	0	0	0	0	0	100	0	0	0	0	0
Ammonium Sulfamate (Ammate)[4]	115	115	440	100	0	0	0	0	0	100	0	0	0	0	0
Total Phenoxy group	--	679	49	30	0	0	70	0	0	46	0	0	54	0	0
2,4,5-T[4]	417	417	27	41	0	0	59	0	0	45	0	0	55	0	0
Silvex[4]	225	263	21	14	0	0	86	0	0	47	0	0	53	0	0
Total Phenyl urea[4]	--	38	121	100	0	0	0	0	0	100	0	0	0	0	0
Diuron[4]	38	38	121	100	0	0	0	0	0	100	0	0	0	0	0
Total Triazines	--	1881	3157	80	0	7	13	0	0	59	0	6	35	0	0
Simazine	1736	1881	3157	80	0	7	13	0	0	59	0	6	35	0	0
Total Bromines	--	446	608	100	0	0	0	0	0	100	0	0	0	0	0
Terbacil (Sinbar)	424	446	608	100	0	0	0	0	0	100	0	0	0	0	0
Total Other Organic	--	2785	1591	0	5	6	90	0	0	0	2	8	89	0	0
Dichlobenil (Casoron)[4]	154	154	135	0	0	100	0	0	0	0	0	100	0	0	0
Paraquat	2137	2631	1457	0	5	0	95	0	0	0	2	0	98	0	0
Oils[4]	305	383	7980	0	0	0	0	0	100	0	0	0	0	0	100
Total Herbicides	--	6328	13946	37	2	4	51	0	6	22	0	2	18	0	57
C. Insecticides															
Total Arsenicals[4]	--	111	57	100	0	0	0	0	0	100	0	0	0	0	0
Lead Arsenate[4]	111	111	57	100	0	0	0	0	0	100	0	0	0	0	0
Total Organochlorine	--	1152	936	100	0	0	0	0	0	100	0	0	0	0	0
Methoxychlor (Marlate)[4]	25	168	73	100	0	0	0	0	0	100	0	0	0	0	0
Endosulfan (Thiodan)	478	983	836	100	0	0	0	0	0	100	0	0	0	0	0

Pesticide Active Ingredient[2] (a.i.)	Acres Treated	Acre Treatments[3]	Quantity Applied (lbs a.i.)	Formulations Used Percent of Acre Treatments[3]						Formulations Used Percent of Quantity Applied					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
Total Organophosphates	--	55021	67187	90	1	0	5	0	3	93	2	0	4	0	1
Phosmet (Imidan)	7507	35754	55462	100	0	0	0	0	0	100	0	0	0	0	0
Phosphamidon (Dimecron)[4]	251	251	113	0	6	0	94	0	0	0	16	0	84	0	0
Dimethoate (Cygon)[4]	628	540	392	0	71	0	29	0	0	0	75	0	25	0	0
Methyl Parathion[4]	64	64	64	0	0	0	100	0	0	0	0	0	100	0	0
Parathion[4]	319	742	713	17	0	0	83	0	0	1	0	0	99	0	0
Demeton (Systox)[4]	404	404	455	0	0	0	100	0	0	0	0	0	100	0	0
Malathion[4]	48	263	44	100	0	0	0	0	0	100	0	0	0	0	0
Diazinon[4]	83	83	102	100	0	0	0	0	0	100	0	0	0	0	0
Azinphosmethyl (Guthion)	4048	12404	6894	100	0	0	0	0	0	100	0	0	0	0	0
Ethion	2022	2083	1679	0	9	0	5	0	87	0	48	0	2	0	49
Phosalone (Zolone)	994	1323	1269	0	5	0	95	0	0	0	0	0	91	0	0
Total Carbamates	--	1536	2234	100	0	0	0	0	0	100	0	0	0	0	0
Mercaptodimethur (Mesurol)[4]	3	3	2	100	0	0	0	0	0	100	0	0	0	0	0
Carbaryl (Sevin)	1071	1533	2231	100	0	0	0	0	0	100	0	0	0	0	0
Total Organic Chemicals	--	55708	70357	91	1	0	5	0	3	93	2	0	4	0	1
Oils	7240	9623	319047	0	0	0	6	0	94	0	0	0	6	0	94
Total Insecticides	--	67442	389461	78	1	0	5	0	16	17	0	0	6	0	77
D. Miticides															
Total Miticides	--	8265	4667	97	3	0	0	0	0	96	4	0	0	0	0
Binapacryl (Morocide)[4]	105	105	26	100	0	0	0	0	0	100	0	0	0	0	0
Propargite (Omite)	660	2357	1175	100	0	0	0	0	0	100	0	0	0	0	0
Dicofol (Kelthane)	669	811	472	70	30	0	0	0	0	59	41	0	0	0	0
Oxythioquinox (Morestan)[4]	59	59	8	100	0	0	0	0	0	100	0	0	0	0	0
Cyhexatin (Plictran)	3182	4933	2986	100	0	0	0	0	0	100	0	0	0	0	0

Table 7. Page 4

Pesticide Active Ingredient[2] (a.i.)	Acres Treated	Acre Treatments[3]	Quantity Applied (lbs a.i.)	Formuations Used Percent of Acre Treatments[3]						Formulations Used Percent of Quantity Applied					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
E. Rodenticides															
Total Rodenticides	--	1441	229	2	0	97	0	1	0	6	0	94	0	0	0
Diphacinon (Diphacin)[4]	70	70	0[a]	0	0	100	0	0	0	0	0	0	0	0	0
Zinc Phosphide (Phosvin, Zinc-Tox)	1298	1371	229	2	0	97	0	1	0	6	0	94	0	0	0
G. Growth Regulators															
Total Growth Regulators	--	3479	3319	73	0	0	37	0	0	91	0	0	9	0	0
Gibberellic Acid	83	83	2	0	0	0	100	0	0	0	0	0	100	0	0
Daminozide (Alar)	1945	1980	2989	100	0	0	0	0	0	100	0	0	0	0	0
Naphthaleneacetic Acid (NAA)	1032	1155	35	19	0	0	81	0	0	43	0	0	57	0	0
Naphthalene Acetamide[4]	8	8	0[a]	100	0	0	0	0	0	100	0	0	0	0	0
Ethephon (Ethrel)[4]	172	172	291	0	0	0	100	0	0	0	0	0	100	0	0
Diphenylamine	83	83	2	0	0	0	100	0	0	0	0	0	100	0	0

a. Quantity applied to small acreage not equal to one pound.

1. Data from survey of Pesticide Use on Deciduous Fruits - ESCS.

2. The inclusion of some trade names is for information purposes only and does not constitute any endorsement of the product nor is the omission of other trade names intended as reflection on the product.

3. Acre treatments equal the number of separate acres treated multiplied by the number of times that acreage was treated.

4. Data are tabulated from use reports that represent less than 8 percent of the total grower response to the survey questionnaire (less than 10 reports for 128 respondents).

Table 8. Pesticides Applied to Apple Orchards by Development Stage and Coverage as Related to Quantity and Acre Treatments - Ohio 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Reported Quantity Applied (lbs a.i.)	Percent of Quantity Applied							Reported Acre Treatments[3/]	Percent of Acre Treatments[3/]						
		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alternate Row	Each Row	Spot		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alternate Row	Each Row	Spot
A. Fungicides																
Copper Sulfate	457	100	0	0	0	0	100	0	95	90	10	0	0	0	0	100
Maneb	61845	5	3	9	83	0	100	0	13130	6	3	14	77	0	100	0
Zinc Ion Maneb	1516	0	1	29	70	0	100	0	848	0	3	35	63	0	100	0
Zineb	2114	2	0	6	92	0	100	0	1333	2	0	8	90	0	100	0
Metiram	31265	3	2	10	84	0	100	0	15005	4	2	10	84	0	100	0
Captan	39134	8	10	9	73	0	100	0	21014	6	7	9	77	0	100	0
Folpet	743	0	0	0	100	0	90	10	318	0	0	0	100	0	90	10
Captafol	16968	100	0	0	0	0	100	0	2043	100	0	0	0	0	100	0
Dichlone	429	48	3	10	39	0	100	0	2413	56	4	8	32	0	100	0
Dinocap	4742	10	3	11	77	0	100	0	16443	11	3	15	71	0	100	0
Dodine	11724	30	12	9	49	0	100	0	14830	42	13	13	32	0	100	0
Glyodin	306	36	0	0	64	0	100	0	362	20	0	0	80	0	100	0
Streptomycin	561	1	28	48	23	0	90	10	2428	6	28	6	60	0	90	10
Benomyl	3182	37	7	5	52	0	100	0	11318	39	5	7	49	0	100	0
Sulfur	37844	25	6	18	51	10	90	0	8879	19	7	23	50	10	90	0
Total Fungicides	212829	18	5	10	66	0	100	0	110460	19	6	12	63	0	100	0
B. Herbicides																
Ammonium Sulfamate	440	43	0	0	57	0	0	100	115	70	0	0	30	0	0	100
2,4,5-T	27	8	0	0	92	0	60	40	417	27	0	0	73	0	70	30
Silvex	21	0	0	0	100	0	100	0	263	0	0	0	100	0	100	0
Diuron	121	100	0	0	0	0	100	0	38	100	0	0	0	0	100	0
Simazine	3157	83	4	1	12	0	80	20	1881	63	1	14	22	0	70	30
Terbacil	608	92	0	0	8	0	90	10	446	76	0	0	24	0	70	30
Dichlobenil	135	32	0	68	0	0	100	0	154	39	0	61	0	0	100	0
Paraquat	1457	36	3	8	54	0	70	30	2631	32	8	11	49	0	70	30

Table 8. Page 2

Pesticide Active Ingredient[2] (a.i.)	Reported Quantity Applied (lbs a.i.)	Percent of Quantity Applied							Reported Acre Treatments[3]	Percent of Acre Treatments[3]						
		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alternate Row	Each Row	Spot		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alternate Row	Each Row	Spot
Oils	7980	60	2	0	38	0	100	0	383	80	6	0	15	0	100	0
Total Herbicides	13946	63	2	2	33	0	90	10	6328	47	4	10	39	0	70	30
C. Insecticides																
Lead Arsenate	57	0	0	8	92	0	100	0	111	0	0	5	95	0	100	0
Methoxychlor	73	32	0	32	36	0	100	0	168	14	0	14	72	0	100	0
Endosulfan	863	41	0	0	59	0	100	0	983	33	0	0	67	0	100	0
Phosmet	55462	1	0	9	90	0	100	0	36764	1	0	13	86	0	100	0
Phosphamidon	113	100	0	0	0	0	80	20	251	100	0	0	0	0	90	10
Dimethoate	392	88	0	0	12	0	100	0	640	86	0	0	14	0	100	0
Methyl Parathion	64	0	0	0	100	100	0	0	64	0	0	0	100	100	0	0
Parathion	713	1	0	0	99	0	100	0	742	17	0	0	83	0	100	0
Demeton	455	90	0	0	10	0	100	0	404	76	0	0	24	0	100	0
Malathion	44	13	0	13	74	0	100	0	263	9	0	9	82	0	100	0
Diazinon	102	100	0	0	0	0	50	50	83	100	0	0	0	0	70	30
Azinphosmethyl	6892	0	0	24	75	10	90	0	12404	1	2	21	76	0	100	0
Ethion	1679	92	0	0	0	0	100	0	2083	98	2	0	0	0	100	0
Phosalone	1269	22	0	0	78	10	90	0	1323	11	0	0	89	10	90	0
Mercaptodimethur	2	0	0	0	100	0	100	0	3	0	0	0	100	0	100	0
Carbaryl	2231	0	0	1	99	0	100	0	1533	0	2	1	97	0	100	0
Oils	319047	90	0	0	9	0	100	0	9623	93	1	0	6	0	100	0
Total Insecticides	389461	75	0	2	23	0	100	0	67442	20	1	11	69	0	100	0
D. Miticides																
Binapacryl	26	0	0	0	100	0	100	0	105	0	0	0	100	0	100	0
Propargite	1175	0	0	0	100	20	80	0	2357	0	0	0	100	20	80	0
Dicofol	472	14	1	24	61	0	100	0	811	14	2	11	73	0	100	0
Morestan	8	100	0	0	0	0	0	100	59	100	0	0	0	0	0	100
Cyhexatin	2986	0	0	0	100	0	100	0	4933	0	0	0	100	0	100	0
Total Miticides	4667	2	0	2	96	10	90	0	8265	2	0	1	97	10	90	0

Table 8. Page 3

Pesticide Active Ingredient[2] (a.i.)	Reported Quantity Applied (lbs a.i.)	Percent of Quantity Applied							Acre Treatments[3]	Percent of Acre Treatments[3]						
		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt[4] Row	Each Row	Spot		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt[4] Row	Each Row	Spot
E. Rodenticides																
Diphacinone	0	100	0	0	0	0	100	0	70	100	0	0	0	0	100	0
Zinc Phosphide	229	26	0	4	70	0	70	30	1371	23	0	3	73	0	70	30
Total Rodenticides	229	26	0	4	70	0	70	30	1441	27	0	3	70	0	70	30
F. Growth Regulators																
Gibberellic Acid	2	0	44	16	40	0	100	0	83	0	43	15	42	0	100	0
Alar	2989	5	0	5	90	0	90	10	1980	6	0	7	87	0	90	10
Naphthaleneacetic Acid	35	0	0	4	96	0	90	10	1155	0	0	3	97	0	90	10
Naphthalene Acetamide	0	0	0	100	0	0	100	0	8	0	0	100	0	0	100	0
Ethephon	291	0	0	0	100	0	100	0	172	0	0	1	99	0	100	0
Diphenylamine	2	0	44	16	40	0	100	0	83	0	43	15	42	0	100	0
Total Growth Regulators	3319	5	0	5	91	0	90	10	3479	3	2	6	88	0	90	10

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

2. See Table 7 for listing for common-trade name relationships and data that represents response on less than 8 percent of the survey reports.

3. See Text and Table 7 for definition of acre treatments.

4. Means alternate row.

Table 9. Rate of Application Frequency and Quantity of Pesticides Applied to Apple Orchards in Ohio - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Quantity Per Acre Per Application (lbs a.i.)	Applications Per Season (average)	Quantity Per Acre Per Season (lbs a.i.)	Acres Treated	Total Quantity 1978 (lbs a.i.)
A. Fungicides					
Copper Sulfate	4.781	1.000	4.781	95	457
Maneb	4.710	4.410	20.772	2977	61845
Zinc Ion Maneb	1.787	5.539	9.898	153	1516
Zineb	1.586	2.290	3.632	582	2114
Metiram	2.084	5.336	11.119	2812	31265
Captan	1.862	4.936	9.192	4257	39134
Folpet	2.334	2.468	5.760	129	743
Captafol	8.304	1.078	8.952	1895	16968
Dichlone	0.178	3.812	0.678	633	429
Dinocap	0.288	4.708	1.358	3493	4742
Dodine	0.791	3.429	2.711	4325	11724
Glyodin	0.844	1.500	1.266	242	306
Streptomycin	0.231	2.600	0.601	934	561
Benomyl	0.281	3.495	0.983	3238	3182
Sulfur	4.262	3.338	14.226	2660	37844
B. Herbicides					
Ammonium Sulfamates	3.819	1.000	3.819	115	440
2,4,5-T	0.066	1.000	0.066	417	27
Silvex	0.081	1.170	0.095	225	21
Diuron	3.200	1.000	3.200	38	121
Simazine	1.678	1.084	1.819	1736	3157
Terbacil	1.364	1.051	1.434	424	608
Dichlobenil	0.873	1.000	0.873	154	135
Paraquat	0.554	1.231	0.682	2137	1457
Oils	20.811	1.258	26.172	305	7980
C. Insecticides					
Lead Arsenate	0.515	1.000	0.515	111	57
Methoxychlor	0.434	6.698	2.908	25	73
Endosulfan	0.878	2.057	1.805	478	863

Table 9. Page 2

Pesticide Active Ingredient[2] (a.i.)	Quantity Per Acre Per Application (lbs a.i.)	Applications Per Season (average)	Quantity Per Acre Per Season (lbs a.i.)	Acres Treated	Total Quantity 1978 (lbs a.i.)
Phosmet	1.509	4.898	7.389	7507	55462
Phosphamidon	0.450	1.000	0.450	251	113
Dimethoate	0.613	1.019	0.625	628	392
Methyl Parathion	1.000	1.000	1.000	64	64
Parathion	0.960	2.326	2.234	319	713
Demeton	1.126	1.000	1.126	404	455
Malathion	0.168	5.443	0.914	48	44
Diazinon	1.226	1.000	1.226	83	102
Azinphosmethyl	0.556	3.064	1.703	4048	6894
Ethion	0.806	1.030	0.830	2022	1679
Phosalone	0.959	1.331	1.277	944	1269
Mercaptodimethur	0.750	1.000	0.750	3	2
Carbaryl	1.456	1.431	2.083	1071	2231
Oils	33.154	1.329	44.070	7240	319048
D. Miticides					
Binapacryl	0.243	1.000	0.243	105	26
Propargite	0.499	3.573	1.781	660	1175
Dicofol	0.582	1.161	0.675	699	472
Morestan	0.138	1.000	0.138	59	8
Cyhexatin	0.605	1.550	0.938	3182	2986
E. Rodenticides					
Diphacinone	0.001	1.000	0.001	70	0
Zinc Phosphide	0.167	1.056	0.176	1298	229
G. Growth Regulators					
Gibberellic Acid	0.024	1.000	0.024	83	2
Alar	1.510	1.018	1.537	1945	2989
Naphthaleneacetic Acid	0.030	1.119	0.033	1032	35
Naphthalene Acetamide	0.017	1.000	0.017	8	0
Ethephon	1.692	1.000	1.692	172	291
Diphenylamine	0.024	1.000	0.024	83	2

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

2. See Table 7 for common-trade name relationships and data representing response on less than 8 percent of the survey reports

Table 10. Application of Pesticides to Apple Orchards in Ohio at the Last Post-Bloom Scheduel Prior to Harvest - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Application Last Post-Bloom		
	Quantity lbs a.i.	Acres Treated	per Acre lbs a.i.
A. Fungicides			
Maneb	11553	3265	3.539
Zinc Ion Maneb	192	107	1.797
Zineb	1349	763	1.770
Metiram	7836	3996	1.951
Captan	11621	6113	1.901
Folpet	743	318	2.334
Dichlone	27	142	0.193
Dinocap	955	4266	0.224
Dodine	2067	2038	1.014
Glyodin	147	217	0.675
Streptomycin	49	415	0.117
Benomyl	458	2195	0.209
Sulfur	7310	1919	3.809
Total Fungicides	44308	25756	1.720
B. Herbicides			
Ammonium Sulfamate	250	35	7.125
2,4,5-T	24	278	0.085
Silvex	19	225	0.083
Simazine	367	402	0.913
Terbacil	37	85	0.438
Paraquat	451	971	0.464
Oils	3058	57	54.000
Total Herbicides	4206	2053	2.048
C. Insecticides			
Lead Arsenate	53	105	0.501
Methoxychlor	6	25	0.230
Endosulfan	305	383	0.795
Phosmet	13057	10836	1.205
Dimethoate	46	89	0.520
Methyl Parathion	64	64	1.000
Parathion	706	616	1.145
Demeton	45	98	0.457

Table 10. Page 2

Pesticide Active Ingredient[2/] (a.i.)	Application Last Post-Bloom		
	Quantity lbs a.i.	Acres Treated	per Acre lbs a.i.
C. Insecticides (continued)			
Malathion	8	48	0.156
Azinphosmethyl	2380	4329	0.550
Phosalone	804	892	0.902
Mercaptodimethur	2	3	0.750
Carbaryl	1734	1104	1.571
Total Organic less Oil	19156	18488	1.036
Oils	4221	78	54.000
Total Insecticides	23430	18671	1.255
D. Miticides			
Binapacryl	26	105	0.243
Propargite	552	1074	0.514
Dicofol	288	590	0.488
Cyhexatin	1362	3347	0.407
Total Miticides	2228	5116	0.435
E. Rodenticides			
Zinc Phosphide	81	606	0.134
F. Growth Regulators			
Gibberellic Acid	1	35	0.022
Alar	2681	1713	1.565
Naphthaleneacetic Acid	32	1093	0.030
Ethephon	290	170	1.706
Diphenyalmine	1	35	0.022
Total Growth Regulators	3005	3046	0.986

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS

2. See Table 7 for common-trade name relationships and data representing response on less than 8 percent of the survey reports.

Table 11. Occurrence of Pests on Apples in Ohio by Stage of Development - 1978[1/]

Pest	Occurrence of Pest Problem (Percent of Farms)			
	Pre-Bloom	Bloom	Petal-Fall	Post-Bloom
Aphids	58.4	6.9	27.3	39.7
Beetles	0.8	0.6	4.7	17.7
Blights	6.1	9.0	7.1	11.7
Bugs	12.4	3.4	20.6	31.3
Cherry Slugs	1.0	0.0	0.0	0.0
Fruit Flies	1.0	1.5	6.3	14.0
Fruit Rots	8.8	2.8	15.1	28.7
Maggots	5.0	3.9	15.0	36.0
Mites	61.8	11.3	20.3	51.4
Mice/Voles	2.8	0.8	0.8	6.1
Mildews/Molds	26.4	12.2	25.3	36.6
Moths/Worms	12.8	8.6	49.9	62.2
Nematodes	0.8	0.0	0.3	0.3
Other Rodents	0.0	0.0	0.0	0.0
Pear Psylla	0.5	0.0	0.9	1.8
Rusts	9.6	0.3	4.1	8.4
Scabs	81.8	35.2	66.3	76.5
Scales	47.4	5.1	8.2	16.1
Soil Borne Insects	0.0	0.0	0.8	0.8
Thrips	4.4	0.0	4.0	2.5
Tree Rots	2.2	0.7	0.3	4.1
Weeds, Broadleaf/Grasses	16.8	2.2	2.4	17.8
Vines/Brush	1.5	1.4	1.1	2.9
Other	0.0	0.6	2.8	3.2

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS

Table 12. Apple Tree Loss to Mice, Other Rodents, and Deer in Ohio and Effectiveness of Control Methods - 1978[1/]

Cause of Tree Loss	Number of Trees Lost		Number of Producers Reporting a Loss	Control Method (Percent using method that reported effective control.)			No Reply
	Total	Percent Bearing		Chemicals	Cultural[2/]	Mechanical[3/]	(percent)
Mice	2227	.005	150	36.7	26.5	7.0	29.7
Other Rodents	2430	.006	52	19.7	12.7	7.3	13.9
Deer	4820	.012	88	17.3	8.1	0.0	47.8

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS

2. Involves mowing, raking the tree base, disking, odor repellents, use of herbicides for weed removal, etc.

3. Involves a physical barrier such as stone, gravel, wire, cloth guards, sound devices, firearms, traps, etc.

Table 13. Choice of Pesticide Information Cited by Apple Growers[1/]

Source of Information	Type of Information		
	Pest Indentification & Scouting	Product Selection & Application Rates	Application Timing & Methods
	(Percent Indicating Source as First Choice)		
Chemical Company	14.3	15.1	10.0
Chemical Distributor	13.2	16.2	11.6
Extension Specialist	37.1	55.9	57.4
County or Area Agent	1.5	1.4	1.4
Private Consultant	3.6	3.0	0.8
Self/Other Producers	29.6	7.9	18.0
None of the Above	0.8	0.8	0.8

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

Table 14. Quantities of Pesticide Applied to Peach Orchard Acreage in Ohio and Formulations Used - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Acres Treated	Acre Treatments[3/]	Quantity Applied (lbs a.i.)	Formulations Used Percent of Acre Treatments[3/]						Formulations Used Percent of Quantity Used					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
A. Fungicides															
Total Dithiocarbamates	--	692	1348	100	0	0	0	0	0	100	0	0	0	0	0
Ferbam[4/]	502	634	1301	100	0	0	0	0	0	100	0	0	0	0	0
Thiram[4/]	58	58	47	100	0	0	0	0	0	100	0	0	0	0	0
Total Phthalimides	--	2835	5223	99	0	0	1	0	0	99	0	0	1	0	0
Captan	828	2806	5202	99	0	0	1	0	0	99	0	0	1	0	0
Folpet (Phaltan)[4/]	6	28	21	100	0	0	0	0	0	100	0	0	0	0	0
Total Karathane, Dodine & Quinones	--	2729	848	100	0	0	0	0	0	100	0	0	0	0	0
Dichlone (Phygon)	1204	2631	767	100	0	0	0	0	0	100	0	0	0	0	0
Dinocap (Karathane)[4/]	7	64	43	100	0	0	0	0	0	100	0	0	0	0	0
Dodine (Cyprex)[4/]	10	35	38	100	0	0	0	0	0	100	0	0	0	0	0
Benomyl	674	2241	962	100	0	0	0	0	0	100	0	0	0	0	0
Total Organic Chemicals	--	8497	8381	100	0	0	0	0	0	99	0	0	1	0	0
Sulfur (Dusting)	1571	7083	50071	100	0	0	0	0	0	100	0	0	0	0	0
Total Fungicides	--	15580	58452	100	0	0	0	0	0	100	0	0	0	0	0
B. Herbicides															
Total Triazines	--	151	374	100	0	0	0	0	0	100	0	0	0	0	0
Simazine	151	151	374	100	0	0	0	0	0	100	0	0	0	0	0
Total Bromines	--	108	96	100	0	0	0	0	0	100	0	0	0	0	0
Terbacil (Sinbar)[4/]	108	108	96	100	0	0	0	0	0	100	0	0	0	0	0

Table 14. Page 2

Pesticide Active Ingredient[2] (a.i.)	Acres Treated	Acre Treatments[3]	Quantity Applied (lbs a.i.)	Formulations Used Percent of Acre Treatments[3]						Formulations Used Percent of Quantity Used					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
Total Other Herbicides	--	551	309	0	0	1	99	0	0	0	0	2	98	0	0
Dichlobenil (Casoron)[4]	3	3	6	0	0	100	0	0	0	0	0	100	0	0	0
Paraquat	361	547	303	0	0	0	100	0	0	0	0	0	100	0	0
Total Organic Chemicals	--	810	779	32	0	0	68	0	0	60	0	1	39	0	0
Oils[4]	7	33	176	0	0	0	0	0	1	0	0	0	0	0	100
Total Herbicides	--	842	956	31	0	0	65	0	4	49	0	1	32	0	18
C. Insecticides															
Total Organochlorine	--	1004	1361	95	0	0	5	0	0	95	0	0	5	0	0
Endosulfan (Thiodan)	484	1004	1361	95	0	0	5	0	0	95	0	0	5	0	0
Total Organophosphates	--	8130	5462	90	2	0	7	0	0	91	4	0	5	0	0
Phosmet (Imidan)	1143	3469	3314	100	0	0	0	0	0	100	0	0	0	0	0
Chlorpyrifos (Dursban)[4]	39	75	41	0	3	0	97	0	0	0	17	0	83	0	0
Methyl Parathion[4]	27	136	217	0	0	0	20	0	0	0	80	0	20	0	0
Parathion	410	1130	372	84	5	0	10	0	0	71	5	0	24	0	0
Malathion[4]	6	17	11	0	100	0	0	0	0	0	100	0	0	0	0
Azinphosmethyl (Guthion)	1091	3300	1506	88	0	0	12	0	0	93	0	0	7	0	0
Ethion[4]	3	3	0	0	100	0	0	0	0	0	100	0	0	0	0
Total Carbamates	--	1120	1575	99	0	0	1	0	0	99	0	0	1	0	0
Carbaryl (Sevin)	756	1120	1575	99	0	0	1	0	0	99	0	0	1	0	0
Total Organic Chemicals	--	10254	8398	92	2	0	6	0	0	93	3	0	4	0	0
Oils	167	232	6574	0	0	0	0	0	100	0	0	0	0	0	100
Total Insecticides	--	10486	14973	90	2	0	6	0	2	52	1	0	2	0	44

Pesticide Active Ingredient[2] (a.i.)	Acres Treated	Acre Treatments[3]	Quantity Applied (lbs a.i.)	Formulations Used Percent of Acre Treatments[3]						Formulations Used Percent of Quantity Used					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
D. Miticides															
Total Miticides	--	548	227	86	14	0	0	0	0	95	5	0	0	0	0
Ovex[4]	9	17	4	100	0	0	0	0	0	100	0	0	0	0	0
Propargite (Omite)[4]	26	68	29	100	0	0	0	0	0	100	0	0	0	0	0
Dicofol (Kelthane)	174	335	139	78	22	0	0	0	0	92	8	0	0	0	0
Cyhexatin (Plictran)[4]	121	121	52	100	0	0	0	0	0	100	0	0	0	0	0
Tetradifon (Tedion)[4]	12	12	3	100	0	0	0	0	0	100	0	0	0	0	0
E. Rodenticides															
Total Rodenticides	--	52	8	0	0	100	0	0	0	0	0	100	0	0	0
Zinc Phosphide (Phosvin, Zinc-Tox)[4]	52	52	8	0	0	100	0	0	0	0	0	100	0	0	0
F. Plant Growth Regulators															
Total Growth Regulators	--	113	2	0	0	0	100	0	0	0	0	0	100	0	0
Naphthaleneacetic Acid[4]	38	113	2	0	0	0	100	0	0	0	0	0	100	0	0

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS

2. The inclusion of some trade names is for information purposes only and does not involve any endorsement of the product nor is the omission of other trade names intended as any reflection on the product.

3. Acre treatments equals the number of separate acres treated multiplied by the number of times during the year those acres were treated.

4. Data are tabulated from use reports that represent less than 10 percent of the total grower response to the survey questionnaire (less than 9 reports for 92 respondents).

Table 15. Quantity of Pesticides Applied to Peaches by Method Applied, Development Stage, and Coverage[1/]

Pesticide Active Ingredient[2/] (a.i.)	Quantity Applied (lbs a.i.)	Method of Application				Stage of Development				Type of Coverage		
		Self		Custom		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt[3/] Row	Each Row	Spot
		Ground	Aerial	Ground	Aerial	(Percent of Quantity Applied)						
A. Fungicides												
Total Dithiocarbamates	1348	100	0	0	0	79	4	0	18	0	100	0
Ferbam	1301	100	0	0	0	82	4	0	15	0	100	0
Thiram	48	100	0	0	0	0	0	0	100	0	100	0
Total Phthalimides	5223	96	4	0	0	1	1	5	92	0	100	0
Captan	5202	96	4	0	0	0	1	5	92	0	100	0
Folpet	21	100	0	0	0	1	0	0	100	0	0	100
Total Karathane, Dodine & Quinones	848	92	8	0	0	45	22	2	30	0	100	0
Dichlone	767	100	0	0	0	45	24	2	29	0	100	0
Dinocap	43	0	100	0	0	24	0	12	64	0	100	0
Dodine	38	28	72	0	0	72	0	0	28	0	100	0
Benomyl	962	100	0	0	0	10	8	13	69	0	90	10
Total Organic Chemicals	8381	97	3	0	0	19	4	5	71	0	100	0
Sulfur (Dusting)	50071	94	0	0	6	14	9	11	66	0	100	0
Total Fungicides	58452	94	0	0	6	15	9	10	66	0	100	0
B. Herbicides												
Total Triazines	374	100	0	0	0	82	1	7	11	0	50	50
Simazine	374	100	0	0	0	82	1	7	11	0	50	50
Total Bromines	96	100	0	0	0	76	0	0	24	0	0	100
Terbacil	96	100	0	0	0	76	0	0	24	0	0	100

Table 15. Page 2

Pesticide Active Ingredient[2] (a.i.)	Quantity Applied (lbs a.i.)	Method of Application				Stage of Development				Type of Coverage		
		Self		Custom								
		Ground	Aerial	Ground	Aerial	Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt[3] Row	Each Row	Spot
		(Percent of Quantity Applied)										
Total Other Herbicides	309	100	0	0	0	14	2	4	80	0	70	30
Dichlobenil	6	100	0	0	0	100	0	0	0	0	0	100
Paraquat	303	100	0	0	0	13	2	4	82	0	70	30
Total Organic Chemicals	779	100	0	0	0	54	1	5	40	0	50	50
Oils	176	100	0	0	0	0	0	0	100	0	100	0
Total Herbicides	956	100	0	0	0	44	1	4	51	0	60	40
C. Insecticides												
Total Organochlorine	1361	99	1	0	0	17	0	2	81	0	90	10
Endosulfan	1361	99	1	0	0	17	0	2	81	0	90	10
Total Organophosphates	5462	98	2	0	0	0	1	11	87	0	100	0
Phosmet	3314	97	3	0	0	0	2	10	88	0	100	0
Chlorpyrifos	41	100	0	0	0	0	0	0	100	0	100	0
Methyl Parathion	217	100	0	0	0	0	0	20	80	0	100	0
Parathion	372	100	0	0	0	0	1	11	88	0	100	0
Malathion	11	100	0	0	0	0	0	0	100	0	0	100
Azinphosmethyl	1506	98	2	0	0	1	1	12	86	0	100	0
Ethion	0	100	0	0	0	100	0	0	0	0	100	0
Total Carbamates	1575	100	0	0	0	0	0	0	100	0	100	0
Carbaryl	1575	100	0	0	0	0	0	0	100	0	100	0
Total Organic Chemicals	8398	98	2	0	0	3	1	8	88	0	100	0
Oils	6574	90	10	0	0	91	0	0	9	0	100	0
Total Insecticides	14973	95	5	0	0	42	1	4	54	0	100	0

Table 15. Page 3

Pesticide Active Ingredient[2] (a.i.)	Quantity Applied (lbs a.i.)	Method of Application				Stage of Development				Type of Coverage		
		Self		Custom		Pre-Bloom	Petal Fall		Post-Bloom	Alt[3] Row	Each Row	Spot
		Ground	Aerial	Ground	Aerial	(Percent of Quantity Applied)						
D. Miticides												
Total Miticides	227	100	0	0	0	0	3	10	87	0	100	0
Ovex	4	100	0	0	0	0	0	0	100	0	100	0
Propargite	29	100	0	0	0	0	0	21	79	0	100	0
Dicofol	129	100	0	0	0	0	5	12	83	0	100	0
Cyhexatin	52	100	0	0	0	0	0	0	100	0	100	0
Tetradifon	3	100	0	0	0	0	0	0	100	0	100	0
E. Rodenticides												
Total Rodenticides	8	100	0	0	0	95	0	0	5	0	100	0
Zinc Phosphide	8	100	0	0	0	95	0	0	5	0	100	0
F. Plant Growth Regulators												
Total Growth Regulators	2	100	0	0	0	0	0	0	100	0	100	0
Naphthaleneacetic Acid	2	100	0	0	0	0	0	0	100	0	100	0

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

2. See Table 14 for common-trade name relationships and data representing response on less than 10 percent of the survey reports.

3. Means alternate row.

Table 16. Pesticides Applied to Peaches by Acre Treatments by Method Applied, Development Stage and Coverage[1/]

Pesticide Active Ingredient[2/] (a.i.)	Acre Treatments[3/]	Method of Application				Stage of Development				Type of Coverage		
		Self		Custom								
		Ground	Aerial	Ground	Aerial	Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt[4/] Row	Each Row	Spot
		(Percent of Acre-Treatments)[3/]										
A. Fungicides												
Total Dithiocarbmates	692	100	0	0	0	70	5	0	25	0	100	0
Ferbam	634	100	0	0	0	76	6	0	18	0	100	0
Thiram	58	100	0	0	0	0	0	0	100	0	100	0
Total Phthalimides	2835	98	2	0	0	2	2	7	89	0	100	0
Captan	2806	98	2	0	0	2	2	7	89	0	100	0
Folpet	28	100	0	0	0	0	0	0	100	0	0	100
Total Karathane, Dodine & Quinones	2729	97	3	0	0	35	30	4	31	0	100	0
Dichlone	2631	100	0	0	0	35	31	4	30	0	100	0
Dinocap	64	0	100	0	0	22	0	11	67	0	100	0
Dodine	35	38	62	0	0	62	0	0	38	0	100	0
Benomyl	2241	100	0	0	0	11	5	11	73	0	100	0
Total Organic Chemicals	8497	98	2	0	0	21	12	6	61	0	100	0
Sulfur (Dusting)	7083	96	0	0	4	16	13	10	61	0	100	0
Total Fungicides	15580	97	1	0	2	19	12	8	61	0	100	0
B. Herbicides												
Total Triazine	151	100	0	0	0	65	4	7	24	0	60	40
Simazine	151	100	0	0	0	65	4	7	24	0	60	40
Total Bromines	108	100	0	0	0	46	0	0	54	0	0	100
Terbacil	108	100	0	0	0	46	0	0	54	0	0	100

Table 16. Page 2

Pesticide Active Ingredient[2] (a.i.)	Acres Treatments[3]	Method of Application				Stage of Development				Type of Coverage		
		Self		Custom								
		Ground	Aerial	Ground	Aerial	Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt Row[4]	Each Row	Spot
		(Percent of Acre-Treatments)[3]										
Total Other Herbicides	551	100	0	0	0	10	6	2	82	0	50	50
Dichlobeil	3	100	0	0	0	100	0	0	0	0	0	100
Paraquat	547	100	0	0	0	9	6	2	83	0	50	50
Total Organic Chemicals	810	100	0	0	0	25	5	3	68	0	50	50
Oils	33	100	0	0	0	0	0	0	100	0	100	0
Total Herbicides	842	100	0	0	0	24	5	2	69	0	50	50
C. Insecticides												
Total Organochlorine	1004	99	1	0	0	29	0	3	69	0	90	10
Endosulfan	1004	99	1	0	0	29	0	3	69	0	90	10
Total Organophosphates	8130	99	1	0	1	1	2	11	87	0	100	0
Phosmet	3469	97	1	0	2	0	2	9	88	0	100	0
Chlorpyrifos	75	100	0	0	0	0	0	0	100	0	100	0
Methyl Parathion	136	100	0	0	0	0	0	20	80	0	100	0
Parathion	1130	100	0	0	0	0	1	14	84	0	100	0
Malathion	17	100	0	0	0	0	0	0	100	0	0	100
Azinphosmethyl	3300	99	1	0	0	1	2	12	86	0	100	0
Ethion	3	100	0	0	0	100	0	0	0	0	100	0
Total Carbamates	1120	100	0	0	0	0	0	1	99	0	100	0
Carbaryl	1120	100	0	0	0	0	0	1	99	0	100	0
Total Organic Chemicals	10254	99	1	0	1	3	1	9	86	0	100	0
oils	232	97	3	0	0	72	0	0	28	0	100	0
Total Insecticides	10486	99	1	0	1	5	1	9	85	0	100	0

Pesticide Active Ingredient[2] (a.i.)	Acres Treatments[3]	Method of Application				Stage of Development				Type of Coverage		
		Self		Custom								
		Ground	Aerial	Ground	Aerial	Pre-Bloom	Bloom	Petal Fall	Post Bloom	Alt[4] Row	Each Row	Spot
		(Percent of Acre-Treatments[3])										
D. Miticides												
Total Miticides	548	100	0	0	0	0	3	10	88	0	100	0
Ovex	17	100	0	0	0	0	0	0	100	0	100	0
Propargite	68	100	0	0	0	0	0	27	73	0	100	0
Dicofol	335	100	0	0	0	0	5	10	85	0	100	0
Cyhexatin	121	100	0	0	0	0	0	0	100	0	100	0
Tetradifon	12	100	0	0	0	0	0	0	100	0	100	0
E. Rodenticides												
Total Rodenticides	52	100	0	0	0	92	0	0	8	0	100	0
Zinc Phosphide	52	100	0	0	0	92	0	0	8	0	100	0
F. Plant Growth Regulators												
Total Growth Regulators	113	100	0	0	0	0	0	0	100	0	100	0
Naphthaleneacetic Acid	113	100	0	0	0	0	0	0	100	0	100	0

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

2. See Table 14 for common-trade name relationships and data repsenting response on less than 10 percent of survey reports.

3. See Table 14 for definition of acre-treatments.

4. Means alternate rows.

Table 17. Rate of Application, Frequency, and Quantity of Pesticides Applied to Peach Orchards in Ohio - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Quantity per Acre per Application (lbs a.i.)	Applications per Season	Quantity per Acre per Season (lbs a.i.)	Acres Treated	Total Quantity 1978 (lbs a.i.)
A. Fungicides					
Ferbam	2.052	1.263	2.592	502	1301
Thiram	0.813	1.000	0.813	58	47
Captan	1.854	3.389	6.281	828	5202
Folpet	0.750	5.000	3.750	6	21
Dichlone	0.291	2.185	0.637	1204	767
Dinocap	0.669	9.000	6.023	7	43
Dodine	1.113	3.319	3.693	10	38
Benomyl	0.429	3.324	1.427	674	962
Sulfur	7.069	4.509	31.878	1571	50071
B. Herbicides					
Simazine	2.482	1.000	2.482	151	374
Terbacil	0.888	1.000	0.888	108	96
Dichlobenil	2.000	1.000	2.000	3	6
Paraquat	0.553	1.157	0.839	361	303
Oils	5.400	5.000	27.000	7	176
C. Insecticides					
Endosulfan	1.356	2.072	2.809	484	1361
Phosmet	0.955	3.305	2.900	1143	3314
Chlorpyrifos	0.538	1.944	1.045	39	41
Methyl Parathion	1.600	5.000	8.000	27	217
Parathion	0.329	2.755	0.907	410	372
Malathion	0.641	3.000	1.924	6	11
Azinphosmethyl	0.457	3.025	1.381	1091	1506
Ethion	0.090	1.000	0.090	3	0
Carbaryl	1.406	1.481	2.083	756	1575
Oils	28.306	1.392	39.389	167	6574
D. Miticides					
Ovex	0.250	2.000	0.500	9	4
Propargite	0.466	2.448	1.141	26	29
Dicofol	0.415	1.922	0.797	174	139
Cyhexatin	0.429	1.000	0.429	121	52
Tetradifon	0.250	1.000	0.250	12	3
E. Rodenticides					
Zinc phosphide	0.148	1.000	0.148	52	8
F. Plant Growth Regulators					
Naphthaleneacetic Acid	0.018	3.000	0.053	38	2

1. Data from 1978 Survey of Pesticides Use on Deciduous Fruits - ESCS.
2. See Table 14 for common-trade name relationships and date representing response on less than 10 percent of the survey reports.

Table 18. Pesticides Applied to Peach Orchards in Ohio at the Last Post-Bloom Schedule before Harvest - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Last Post-Bloom		
	Quantity (lbs. a.i.)	Acres Treated	Quantity Per Acre (lbs a.i.)
A. Fungicides			
Ferbam	95	58	1.642
Thiram	47	58	0.812
Captan	2144	1029	2.083
Folpet	4	6	0.750
Dichlone	67	294	0.229
Dinocap	5	7	0.639
Dodine	3	3	0.812
Benomyl	287	653	0.440
Sulfur (Dusting)	11055	1491	7.416
Total Fungicides	13708	3599	3.809
B. Herbicides			
Simazine	39	36	1.085
Terbacil	24	58	0.406
Paraquat	133	274	0.484
Oils	88	13	0.750
Total Herbicides	284	382	0.744
C. Insecticides			
Endosulfan	614	482	1.433
Phosmet	1169	1228	0.952
Chlorpyrifos	7	2	3.205
Methyl Parathion	174	109	1.600
Parathion	159	383	0.416
Malathion	4	6	0.641
Azinphosmethyl	687	1278	0.450
Carbaryl	1015	721	1.408
Oils	98	11	9.000
Total Insecticides	3827	4165	0.919
D. Miticides			
Ovex	2	9	0.250
Propargite	15	31	0.466
Dicofol	95	186	0.508

Table 18. Page 2

Pesticide Active Ingredient[2/] (a.i.)	Last Post-Bloom		
	Quantity (lbs a.i.)	Acres Treated	Quantity Per Acre (lbs a.i.)
D. Miticides (continued)			
Cyhexatin	52	121	0.429
Tetradifon	3	12	0.250
Total Miticides	166	359	0.453
E. Plant Growth Regulators			
Naphthaleneacetic Acid	1	38	0.018

1. Data from 1978 Pesticide Use Survey on Deciduous Fruits - ESCS

2. See Table 14 for common-trade name relationships and data representing response on less than 10 percent of the survey reports.

Table 19. Occurrences of Pests on Peaches by Stage of Development - 1978[1/]

Pests	Occurrences of Pest Problems			
	Pre-Bloom	Bloom	Petal-Fall	Post-Bloom
	(Percent of Farms)			
Aphids	6.7	1.3	8.4	25.1
Beetles	0.4	0.8	5.4	22.2
Blights	5.4	12.4	5.4	7.9
Bugs	8.8	1.7	30.3	43.2
Cherry Slugs	0.0	0.0	0.0	0.0
Fruit Flies	1.6	0.0	3.4	14.8
Fruit Rots	36.3	42.2	42.6	74.3
Maggots	0.0	3.0	1.4	6.6
Mites	10.3	2.2	17.6	40.7
Mice/Voles	3.8	0.0	0.0	2.0
Mildews/Molds	6.4	3.8	5.7	19.3
Moths/Worms	9.9	6.3	21.7	59.8
Nematodes	0.0	0.0	0.0	0.9
Other Rodents	1.0	0.0	0.0	0.0
Pear Psylla	0.0	0.0	1.2	1.9
Rusts	0.0	1.6	0.6	1.6
Scabs	18.4	12.6	22.3	37.3
Scales	4.8	0.0	1.7	5.0
Soil Borne Insects	0.0	0.0	0.0	0.0
Thrips	0.9	0.0	0.0	0.9
Tree Rots	5.3	0.9	3.8	5.2
Weeds, Broadleaf/Grasses	10.5	2.8	2.3	9.2
Vines/Brush	3.0	0.7	0.0	2.3
Other	4.1	2.0	4.2	3.8

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

Table 20. Peach Tree Loss to Mice, Other Rodents, and Deer in Ohio and Effectiveness of Control Methods - 1978[1/]

Cause of Tree Loss	Number of Trees Lost		Number of Producers Reporting a Loss	Control Method (Percent using method that reported effective control).			No Reply (percent)
	Total	Percent Bearing		Chemicals	Cultural[2/]	Mechanical[3/]	
Mice	1118	0.2	68	0.0	46.3	0.0	27.8
Other Rodents	412	0.0	15	15.9	56.6	0.0	16.8
Deer	1440	0.2	30	27.2	0.0	16.1	45.3

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS

2. Involves mowing, raking the tree base, disking, odor repellents, use of herbicides for weed removal, etc.

3. Involves a physical barrier such as stone, gravel, wire, cloth guards, sound devices, firearms, traps, etc.

Table 21. Choice of Pesticide Information Cited by Peach Growers[1/]

Source of Information	Type of Information		
	Pest Identification & Scouting	Product Selection & Application Rates	Application Timing & Methods
	(Percent Indicating Source of First Choice)		
Chemical Company	11.7	8.6	9.2
Chemical Distributor	8.7	9.3	5.0
Extension Specialist	40.0	58.0	64.1
County or Area Agent	7.5	4.2	6.1
Private Consultant	2.7	0.6	0.6
Other Producers/Self	22.1	11.8	7.5
None of the Above	7.6	7.6	7.6

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

Table 22. Quantities of Pesticides Applied on Tart Cherry Orchards in Ohio and Formulations Used - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Acres Treated	Acre Treatment[3/]	Quantity Applied (lbs a.i.)	Form Used (Percent of Acre-Treatments)[3/]						Form Used (Percent of Quantity Applied)					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
A. Fungicides															
Total Coppers[4/]	--	81	31	2	0	0	98	0	0	9	0	0	91	0	0
Copper Sulfate[4/]	41	81	31	2	0	0	98	0	0	9	0	0	91	0	0
Total Phthalimides	--	71	72	100	0	0	0	0	0	100	0	0	0	0	0
Captan	45	70	70	100	0	0	0	0	0	100	0	0	0	0	0
Folpet (Phaltan)[4/]	1	1	2	100	0	0	0	0	0	100	0	0	0	0	0
Total Karathane, Dodine & Quinones	--	486	285	100	0	0	0	0	0	100	0	0	0	0	0
Dichlone (Phygon)	63	98	30	100	0	0	0	0	0	100	0	0	0	0	0
Dodine (Cyprex)	114	388	256	100	0	0	0	0	0	100	0	0	0	0	0
Glyodin[4/]	4	13	13	0	0	0	100	0	0	0	0	0	100	0	0
Benomyl (Benlate)	128	316	168	100	0	0	0	0	0	100	0	0	0	0	0
Total Organic Chemicals	--	887	539	99	0	0	1	0	0	98	0	0	2	0	0
Total Sulfur	--	152	1031	98	0	0	2	0	0	100	0	0	0	0	0
Calcium Polsulfide[4/]	3	3	5	0	0	0	100	0	0	0	0	0	100	0	0
Sulfur (Dusting)	67	149	1026	100	0	0	0	0	0	100	0	0	0	0	0
Total Fungicides	--	1120	1601	91	0	0	9	0	0	97	0	0	3	0	0
B. Herbicides															
Total Triazine	--	19	28	100	0	0	0	0	0	100	0	0	0	0	0
Simazine	19	19	28	100	0	0	0	0	0	100	0	0	0	0	0
Total Other Herbicides	--	164	77	0	0	0	100	0	0	0	0	0	100	0	0
Paraquat	73	164	77	0	0	0	100	0	0	0	0	0	100	0	0
Total Herbicides	--	182	105	10	0	0	90	0	0	26	0	0	74	0	0
C. Insecticides															
Total Organophosphate	--	493	407	93	0	0	6	0	0	96	0	0	4	0	0
Phosmet (Imidan)	32	48	59	100	0	0	0	0	0	100	0	0	0	0	0
Parathion	61	114	99	90	0	0	10	0	0	95	0	0	5	0	0
Azinophosmethyl (Guthion)	139	329	247	94	0	0	6	0	0	96	0	0	4	0	0
Ethion[4/]	2	2	2	0	0	0	0	0	100	0	0	0	0	0	0

Table 22. Page 2

Pesticide Active Ingredient[2] (a.i.)	Acres Treated	Acre Treatments[3]	Quantity Applied (lbs a.i.)	Form Used (Percent of Acre-Treatments)[3]						Form Used (Percent of Quantity Applied)					
				WP	EC	G	LC	D	Oil	WP	EC	G	LC	D	Oil
Total Carbamates	--	168	188	100	0	0	0	0	0	100	0	0	0	0	0
Mercaptodimethur (Mesurol)	112	129	143	100	0	0	0	0	0	100	0	0	0	0	0
Carbaryl (Sevin)	24	39	44	100	0	0	0	0	0	100	0	0	0	0	0
Total Organic Chemicals	--	661	595	95	0	0	5	0	0	97	0	0	3	0	0
Oils	16	20	698	0	0	0	0	0	100	0	0	0	0	0	100
Total Insecticides	--	681	1293	92	0	0	4	0	0	45	0	0	1	0	54
D. Rodenticides															
Total Rodenticides[4]	--	11	1	0	0	36	0	64	0	0	0	80	0	20	0
Zinc Phosphide - (Phosvin, Zinc-Tox)[4]	11	11	1	0	0	36	0	64	0	0	0	80	0	20	0
E. Plant Growth Regulators															
Total Growth Regulators[4]	--	11	36	100	0	0	0	0	0	100	0	0	0	0	0
Daminozide (Alar)[4]	11	11	36	100	0	0	0	0	0	100	0	0	0	0	0

1. Data from 1978 Pesticide UseSurvey on Deciduous Fruit - ESCS.

2. The inclusion of trade names is for information purposes only and does not imply any endorsement of the product nor is the omission of other trade names intended as any reflection on the product.

3. Acre treatments equals the number of separate acres treated multiplied by the number of times that acreage was treated.

4. Data are tabulated from use reports that represent less than 17 percent of the total grower response to the survey questionnaire (less than 4 reports for 23 respondents).

Table 23. Pesticide Applied on tart Cherry Orchards by Development Stage and Coverage as related to Quantity and Acre Treatments - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Quantity Applied (lbs a.i.)	Stage of Development				Type of Coverage			Acre Treatments[3/]	Stage of Development				Type of Coverage		
		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt[4/] Row	Each Row	Spot		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt[4/] Row	Each Row	Spot
A. Fungicides																
Total Coppers	31	91	0	0	9	0	100	0	81	98	0	0	2	0	100	0
Copper Sulfate	31	91	0	0	9	0	100	0	81	98	0	0	2	0	100	0
Total Phthalimides	72	11	0	9	81	0	100	0	71	4	0	6	91	0	100	0
Captan	70	11	0	6	83	0	100	0	70	4	0	4	92	0	100	0
Folpet	2	0	0	100	0	0	100	0	1	0	0	100	0	0	100	0
Total Karathane, Dodine & Quinones	285	9	7	7	78	0	100	0	486	6	16	8	71	0	100	0
Dichlone	30	7	67	1	25	0	100	0	98	3	80	2	15	0	100	0
Dodine	256	9	0	7	84	0	100	0	388	6	0	9	85	0	100	0
Glyodin	13	0	0	0	100	0	100	0	13	0	0	0	100	0	100	0
Benomyl	168	30	14	28	28	0	100	0	316	23	11	24	43	0	100	0
Total Organic Chemicals	539	16	8	13	63	0	100	0	887	11	13	13	63	0	100	0
Total Sulfur	1031	8	57	4	30	0	100	0	152	8	50	6	36	0	100	0
Calcium Polsulfide	5	0	0	0	100	0	100	0	3	0	0	0	100	0	100	0
Sulfur	1026	9	58	4	30	0	100	0	149	8	51	6	35	0	100	0
Total Fungicides	1601	12	40	7	41	0	100	0	1120	17	17	11	55	0	100	0
B. Herbicides																
Total Triazines	28	49	0	0	51	0	20	80	19	25	0	0	75	0	40	60
Simazine	28	49	0	0	51	0	20	80	19	25	0	0	75	0	40	60
Total Other Herbicides	77	17	0	40	43	0	20	80	164	11	0	27	62	0	20	80
Paraquat	77	17	0	40	43	0	20	80	164	11	0	27	62	0	20	80
Total Herbicides	105	25	0	29	45	0	20	80	182	12	0	24	64	0	20	80
C. Insecticides																
Total Organophosphates	407	2	0	20	78	0	100	0	493	2	0	19	80	0	100	0
Phosmet	59	0	0	40	60	0	100	0	48	0	0	37	63	0	100	0
Parathion	99	0	0	5	95	0	100	0	114	0	0	9	91	0	100	0

Table 23. Page 2

Pesticide Active Ingredient[2] (a.i.)	Quantity Applied (lbs a.i.)	Stage of Development (Percent of Quantity Applied)				Type of Coverage (Percent of Quantity Applied)			Acre Treatments[3]	Stage of Development (Percent of Acre-Treatments)[3]				Type of Coverage (Percent of Acre-Treatments)[3]		
		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt Row	Each Row	Spot		Pre-Bloom	Bloom	Petal Fall	Post-Bloom	Alt Row	Each Row	Spot
Azinphosmethyl	247	2	0	.21	77	0	100	0	329	2	0	20	78	0	100	0
Ethion	2	100	0	0	0	0	100	0	2	100	0	0	0	0	100	0
Total Carbamates	188	0	0	0	100	0	90	10	168	0	0	0	100	0	80	20
Mercaptodimethur	143	0	0	0	100	0	90	10	129	0	0	0	100	0	70	30
Carbaryl	44	0	0	0	100	0	100	0	39	0	0	0	100	0	100	0
Total Organic Chemicals	595	1	0	14	85	0	100	0	661	1	0	14	85	0	90	10
Oils	698	95	0	0	5	0	100	0	20	81	0	0	19	0	100	0
Total Insecticides	1293	52	0	5	42	0	100	0	681	4	0	14	83	0	90	10
D. Rodenticides																
Total Rodenticides	1	20	0	0	80	0	20	80	11	64	0	0	36	0	60	40
Zinc Phosphide	1	20	0	0	80	0	20	80	11	64	0	0	36	0	60	40
E. Plant Growth Regulators																
Total Growth Regulators	36	0	0	0	100	0	100	0	11	0	0	0	100	0	100	0
Alar	36	0	0	0	100	0	100	0	11	0	0	0	100	0	100	0

1. Data from 1978 Pesticide Use Survey of Deciduous Fruits - ESCS

2. See Table 22 for common-trade name relationships and data representing response on less than 10 percent of the survey reports.

3. See Table 22 for definition of acre-treatments.

4. Means alternate row.

Table 24. Rate of Application, Frequency, and Quantity of Pesticides Applied to Tart Cherry Orchards in Ohio - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Quantity per Acre per Application (lbs a.i.)	Applications per Season	Quantity Per Acre Per Season (lbs a.i.)	Acres Treated	Total Quantity 1978 (lbs a.i.)
A. Fungicides					
Copper Sulfate	0.387	1.958	0.757	41	31
Captan	0.999	1.582	1.581	45	70
Folpet	2.000	1.000	2.000	1	2
Dichlone	0.303	1.554	0.470	63	30
Dodine	0.659	3.405	2.224	114	256
Glyodin	0.975	3.000	2.925	4	13
Benomyl	0.533	2.470	1.317	128	168
Calcium Polsulfide	1.631	1.000	1.631	3	5
Sulfur (Dusting)	6.893	2.235	15.404	67	1026
B. Herbicides					
Simazine	1.475	1.000	1.475	19	28
Paraquat	0.472	2.250	1.062	73	77
C. Insecticides					
Phosmet	1.229	1.531	1.882	32	59
Parathion	0.870	1.860	1.618	61	99
Azinphosmethyl	0.750	2.371	1.778	139	247
Ethion	0.900	1.000	0.900	2	2
Mercaptodimethur	1.112	1.155	1.285	112	143
Carbaryl	1.139	1.608	1.826	24	44
Oils	34.935	1.235	43.127	16	698
D. Rodentcides					
Zinc Phosphide	0.084	1.000	0.084	11	1
E. Plant Growth Regulators					
Alar	3.378	11.000	3.378	11	36

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

2. See Table 22 for common-trade name relationships and data representing response on less than 10 percent of the survey reports.

Table 25. Pesticide Applied to Tart Cherries Orchards at Last Post-Bloom Prior to Harvest - 1978[1/]

Pesticide Active Ingredient[2/] (a.i.)	Application Last Post-Bloom		
	Quantity (lbs a.i.)	Acres Treated	Quantity Per Acre (lbs a.i.)
A. Fungicides			
Copper Sulfate	3	2	1.590
Captan	44	51	0.875
Folpet	0	0	0.000
Dichlone	7	15	0.500
Dodine	80	128	0.620
Glyodin	4	4	0.975
Benomyl	31	71	0.440
Calcium Polsulfide	5	3	1.631
Sulfur (Dusting)	151	26	5.755
Total Fungicides	325	300	1.085
B. Herbicides			
Simazine	14	14	1.000
Paraquat	20	58	0.341
Total Herbicides	34	72	0.469
C. Insecticides			
Phosmet	34	29	1.162
Parathion	52	64	0.814
Azinphosmethyl	69	98	0.706
Ethion	0	0	0.000
Mercaptodimethur	117	119	0.983
Carbaryl	37	31	1.172
Oils	34	4	9.000
Total Insecticides	344	346	0.993
D. Rodenticides			
Zinc Phosphide	0	1	0.200
E. Plant Growth Regulators			
Alar	36	11	3.378

1. Data from 1978 Pesticide Use Survey on Deciduous Fruits - ESCS.

2. See Table 22 for common-trade name relationships and data representing response on less than 10 percent of the survey reports.

Table 26. Occurrence of Pests on Tart Cherries by Stage of Development - 1978[1/]

Pest	Occurrence of Pest Problem			
	Pre-Bloom	Bloom	Petal-Fall	Post-Bloom
	(Percent of Farms)			
Aphids	23.8	0.0	9.6	22.9
Beetles	0.0	0.0	6.2	21.5
Blights	2.6	8.1	8.1	9.9
Bugs	9.8	0.0	17.1	23.3
Cherry Slugs	0.0	0.0	4.8	20.7
Fruit Flies	0.0	0.0	16.8	35.3
Fruit Rots	5.8	21.8	22.7	58.2
Maggots	5.6	0.0	3.8	9.0
Mites	3.8	0.0	0.0	13.8
Mice/Voles	4.2	0.0	0.0	12.0
Mildews/Molds	3.8	6.4	9.6	29.5
Moths/Worms	5.6	0.0	11.7	35.1
Nematodes	0.0	0.0	0.0	0.0
Other Rodents	0.0	0.0	0.0	0.0
Pear Psylla	0.0	0.0	0.0	0.0
Rusts	0.0	0.0	0.0	2.9
Scabs	5.6	0.0	0.0	0.0
Scales	6.4	0.0	0.0	5.1
Soil Borne Insect	0.0	0.0	0.0	0.0
Thrips	0.0	0.0	0.0	2.6
Tree Rots	0.0	3.8	3.8	3.8
Weeds, Broadleaf/Grasses	12.2	0.0	10.3	11.1
Vines/Brush	5.1	0.0	0.0	0.0
Other	0.0	0.0	0.0	11.5

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.

Table 27. Tart Cherry Tree Loss and Effectiveness Ranking of Control Methods to Mice, Other Rodents, and Deer in Ohio and Effectiveness of Control Methods - 1978[1/]

Cause of Tree Loss	Number of Trees Lost		Number of Producers Reporting a Loss	Control Method (Percent using method that reported effective control).			No Reply (percent)
	Total	Percent Bearing		Chemicals	Cultural[2/]	Mechanical[3/]	
Mice	62	.00	5	0.0	0.0	0.0	30.9
Other Rodents	26	.00	1	23.5	0.0	0.0	0.0
Deer	191	.00	2	100.0	0.0	0.0	0.0

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS

2. Involves mowing, raking the tree base, disking, odor repellent, use of herbicides for weed removal, etc.

3. Involves a physical barrier such as stone, gravel, wire, cloth guards, sound devices, firearms, traps, etc.

Table 28. Choice of Pesticide Information Cited by Tart Cherry Growers[1/]

Source of Information	Type of Information		
	Pest Identification & Scouting	Product Selection & Application Rates	Application Timing & Methods
	(Percent Indicating Source as First Choice)		
Chemical Company	0.0	13.2	0.0
Chemical Distributor	2.7	3.6	0.0
Extension Specialist	36.4	66.4	71.2
County or Area Agent	8.7	4.8	4.8
Private Consultant	3.9	3.9	3.9
Other Producers/Self	48.2	8.1	20.1
None of the Above	0.0	0.0	0.0

1. Data from 1978 Survey of Pesticide Use on Deciduous Fruits - ESCS.